

metabolism. The magnitude of the plastic equivalent is to a high degree dependent on the nature of the carbon nutrient. This relation is correlated with the heats of combustion of the carbon compounds. Those having the greater caloric value give the highest plastic ratios.—H. HASSELBRING.

Bud variations and fruit markings.—This very interesting question is the subject of a paper by KRAUS,⁵ who has been making studies on the effects of cross-pollination of cultivated fruits. The author calls attention to the frequent occurrence of banded or striped fruits, especially among apples. The most common explanation of this phenomenon is the secondary influence of pollen, but the author explains that this cannot be true xenia, such as occurs in corn. Correspondence with horticulturists and botanists indicated a prevailing opinion that it is due to secondary influence of pollen, though a number believed it due to bud-variation. After explaining the economic importance of the problem, the author describes his methods of work. The conclusions are as follows: "color in the pome fruits is not influenced directly in the immediate cross; new characters cannot be added by the pollen, outside the seed itself, in the immediate cross; the manifestation of color is dependent on many environmental factors; color as usually found is composed of a number of unit characters; somatic segregation may occur and by this means the several factors of color manifest themselves more or less independently (the several colors may appear as bands more or less parallel, or a band of but one color surrounded by the normal color); similar segregation may extend to any group of unit characters of which the plant is composed; segregation may extend to either fruit or leaf buds; if the latter, such variations may be propagated asexually; red in apples may consist of either a single or a complex of unit characters; at least, three reds are recognizable; somatic segregation may be of service to plant breeders as indicating the unit characters of a plant that are likely to exhibit themselves when propagated sexually; segregation generally extends to the flower bud only in apples, while in pears the shoot is frequently affected."—MEL T. COOK.

The development of chalazogams.—NAWASCHIN and FINN⁶ have published a contribution in German which extends the study of *Juglans* published in Russian a year ago and already noted in this journal.⁷ The principal conclusions are: that in seed plants there is a tendency to reduce the male gametes from sperms to naked nuclei; that the evolution of the pollen tube and simplification of the sperm go hand in hand; that *Juglans* and other chalazogamous plants with a well developed binucleate cell which reaches the embryo

⁵ KRAUS, E. J., Bud variations in relation to fruit markings. Biennial Crop Pest and Horticultural Report for 1911 and 1912. Oregon Agric. Exp. Station. pp. 71-78.

⁶ NAWASCHIN, S., and FINN, V., Zur Entwicklungsgeschichte der Chalazogamen. *Juglans regia* und *Juglans nigra*. Mém. Acad. Imp. Sci. St. Pétersbourg 31:1-59. pls. 1-4. 1913.

⁷ BOT. GAZ. 55:94. 1913.

sac in fact show a condition intermediate between a well developed sperm and a naked sperm nucleus; and that this feature indicates the great age of chalazogams. These conclusions, which are practically the same as those given in the previous paper, are based upon a large amount of research and also upon a thorough discussion of the literature, in which the work of American investigators receives generous recognition. Both authors had already become identified with the subject, and no one has contributed more to our knowledge of chalazogamous plants than NAWASCHIN. Besides, as the discoverer of "double fertilization," he has made a reputation for brilliant initiative in research, while his more recent investigation of the sperm nucleus of *Lilium Martagon* entitles him to a place among the authorities in cytological matters. These facts lend weight to the conclusions. The paper deserves a careful reading by everyone who attempts to treat the phylogeny of angiosperms from a cytological standpoint. Three of the large plates are colored, and the fourth (copied from various investigators) gives a useful optical survey of pollen tube structures in various groups of gymnosperms and angiosperms.—CHARLES J. CHAMBERLAIN.

Cecidology.—Among the important foreign contributions is a purely botanical paper by BUYSSON and PIERRE,⁸ in which two species occurring on *Sedum* are discussed. HOUARD⁹ gives good descriptions of a number of cecidia in the Natural History Museum of Paris, restricting his discussions to the galls and not to the causes. KIEFFER¹⁰ describes two new genera and two new species of cecidomyid galls and gall-makers from Formosa.

Among the most interesting American contributions is a very suggestive paper on seedless and malformed fruits by BROWN,¹¹ in which the author, after discussing malformations and russetings caused by frost, also calls attention to the fact that fruits may be abnormal as a result of no pollination or imperfect pollination combined with frost injuries. After pollination, a severe frost may interfere with the fertilization processes and affect both seed and fruit. The author also states that there is relationship between weights of seeds and fruit but does not give figures.

FELT¹² contributes a very valuable entomological study of gall midges, in which he includes keys, descriptions, and drawings of a great many species.—MEL T. COOK.

⁸ BUYSSON, H. DU, et PIERRE, l'ABBE, Nouvelles cecidologiques du centre de la France. *Marcellia* 12:27-35. 1913.

⁹ HOUARD, C., Les collections cécidologiques du laboratoire d'entomologie du Museum d'histoire naturelle du Paris: Galles du Mavor. *Marcellia* 12:35-41. 1913.

¹⁰ KIEFFER, J. J., Description de deux remarquables cécidomyies de Formose. *Marcellia* 12:42-44. 1913.

¹¹ BROWN, F. R., Seedless and malformed fruits. Biennial Crop Pests and Horticultural Report for 1911 and 1912. Oregon Agric. Exp. Station.

¹² FELT, E. P., A study of gall midges. Twenty-eighth Report of the Entomologist of the State of New York. pp. 127-226. 1913.